

Organochlorine and Heavy Metal Contaminants in River Otters Collected from the Puget Sound, 1996

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Extended Abstract

The river otter (*Lutra canadensis*) is a top predator of most aquatic food webs. This mammal has adapted to a wide variety of aquatic habitats, from marine environments to high mountain lakes of North America. River otters eat a wide variety of fish species and aquatic invertebrates, including crabs, crayfish, and mussels. Thus, river otters are good integrators of their aquatic environments and a useful species for determining wildlife contaminant exposure and potential harmful effects. Data presented at this conference is part of a larger study conducted in Oregon and Washington, investigating possible endocrine disruption of developing and maturing reproductive organs of young male river otters. Frozen river otter carcasses (266) were obtained from trappers of Oregon and Washington, of which 22 were from the Puget Sound area. The otters were trapped from 8 locations within Puget Sound or adjacent areas. Necropsies were performed at the Veterinary Diagnostic Laboratory at Oregon State University. Basic morphometric data was collected on each river otter necropsied, with one canine tooth extracted for age determination by counting cementum layers or annuli (each layer represents 1 year of age). A liver sample was collected from each otter, with the samples analyzed for 17 metals, 20 OCs, 47 PCBs, 10 dioxins and 12 furans at the Great Lakes Institute for Environmental Research, University of Windsor, Windsor, Ontario, Canada. Liver samples were also analyzed for butyltins at the National Food Safety and Toxicology Center, Michigan State University

Age classes used to present contaminant data at this conference were: age class 2+ (≥ 2 years old), age class 1 (=1 year old), and age class 0 (<1 year old). Contaminant levels of DDE, sum of PCBs analyzed, Aroclor 1254:1260, Aroclor 1260, and the dioxin-like PCB 126 and PCB 169 were generally the highest in otters trapped in the Bremerton area (Figures 1-6). PCB concentrations in the liver of a river otter trapped in the Bremerton area were the highest for the whole Oregon-Washington study (30.1 ppm, wet wt. for Aroclor 1254:1260) (Figure 3). Only five otters had detectable levels of 2,3,7,8-TCDD, with the highest found in an adult otter trapped at Eglon (2.4 ppt, wet wt.) (Figure 7). Only 3 otters had detectable levels of P5CDD (Figure 8), with levels of the higher chlorinated dioxins found in all otter samples (Figures 9-11). OCDD was the most prominent dioxin quantified. Mercury was found in livers of all river otters analyzed, with the highest concentrations found in the older animals (Figure 12). A 7-year-old male trapped near Fort Ward had the highest mercury concentration of 31.2 ppm (dry wt.). Cadmium was only found in adult otters, except for a single 1-year-old male trapped at Hoodspoint (Figure 13). Of the butyltin compounds, associated with anti-fouling paints used on ships, mono- and dibutyltins predominated in the river otter liver samples analyzed, with little tributyltin found (Figure 14). The greatest concentration of total butyltins of 2,610 ppb (wet wt.) was from a river otter collected near Fort Ward.

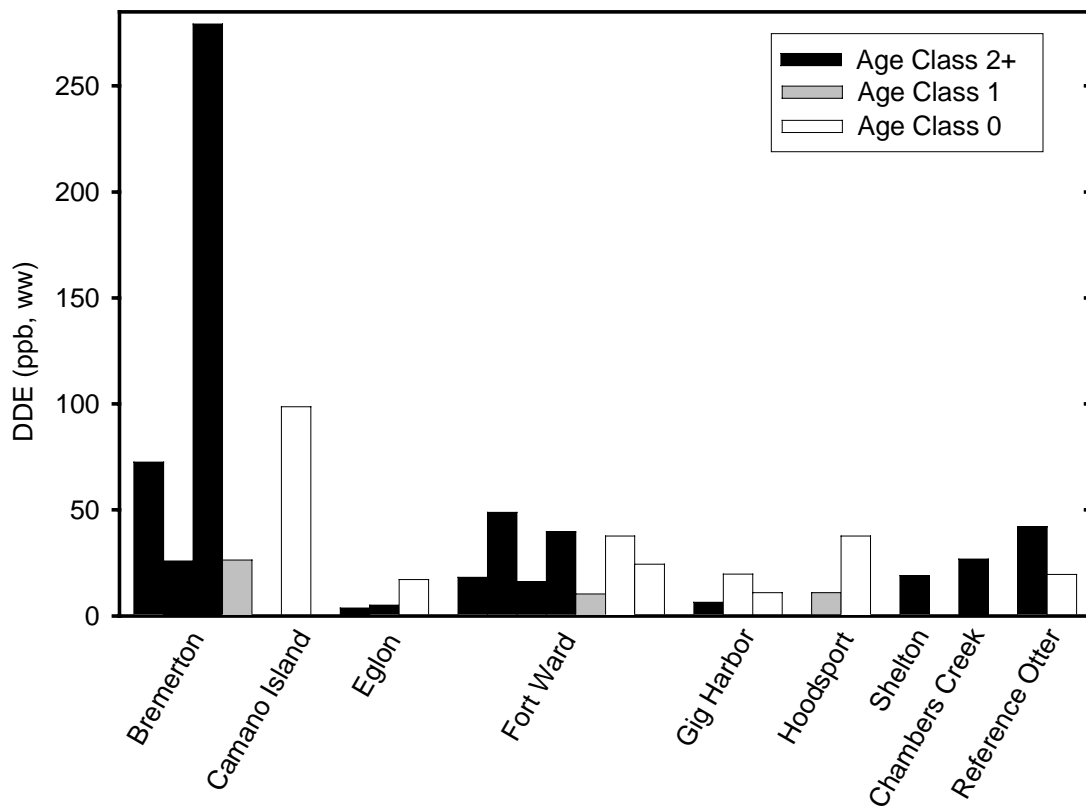


Figure 1. DDE levels in livers of river otter (age class 2+, 1, 0) collected from the Puget Sound, Washington, 1996. Levels reported in parts per billion (ppb) on a wet weight (ww) basis.

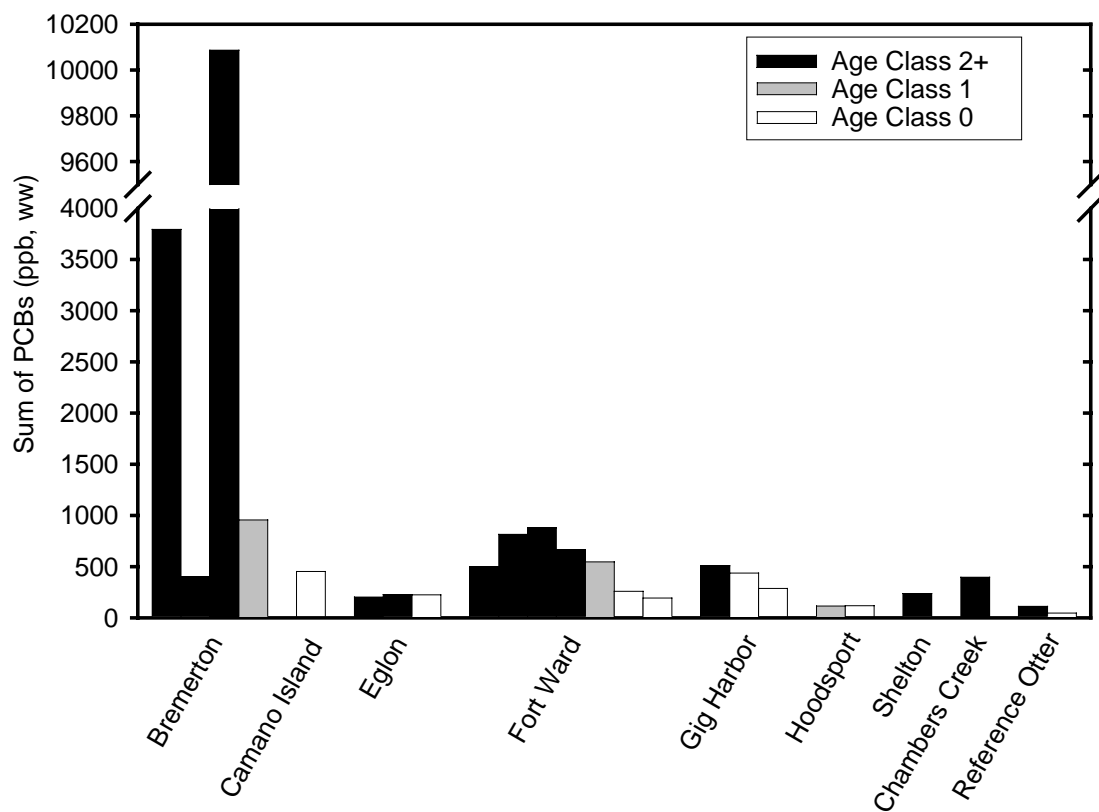


Figure 2. Sum of PCB levels in livers of river otters (age class 0, 1, 2+) collected from the Puget Sound, Washington, 1996. Levels reported in parts per billion (ppb) on a wet weight (ww) basis.

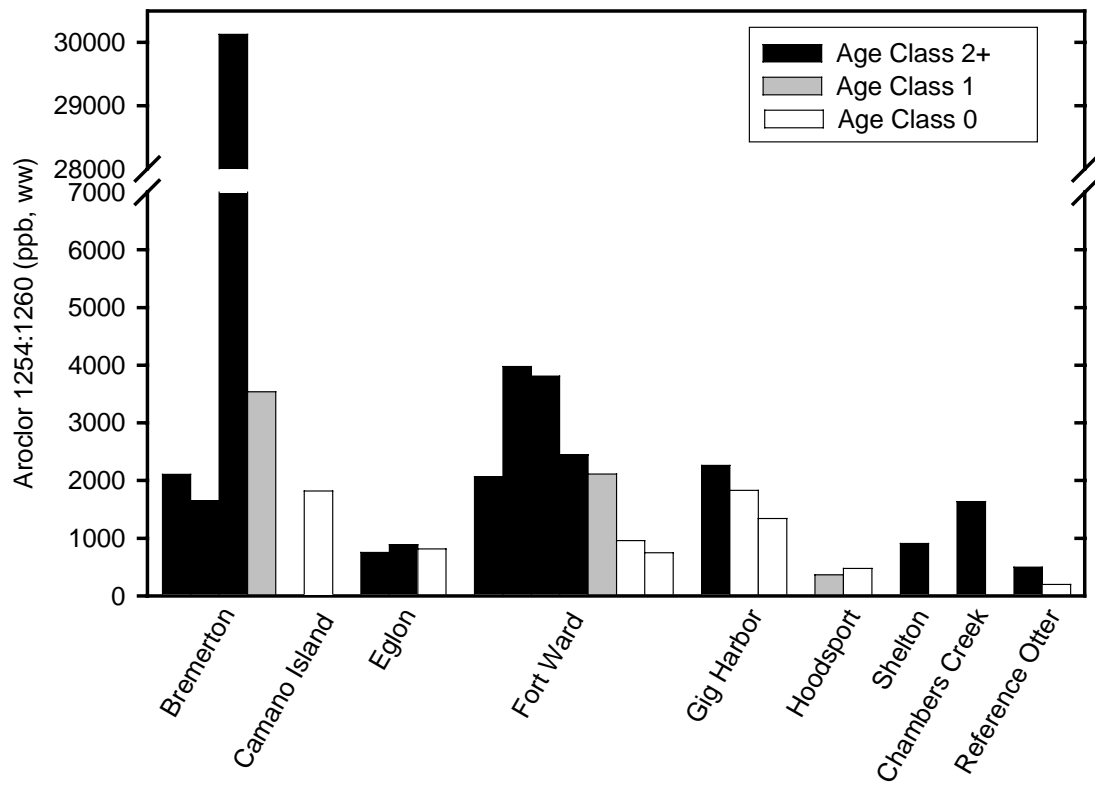


Figure 3. Aroclor 1254:1260 levels in livers of river otter (age class 2+, 1, 0) collected from the Puget Sound, Washington, 1996. Levels reported in parts per billion (ppb) on a wet weight (ww) basis.

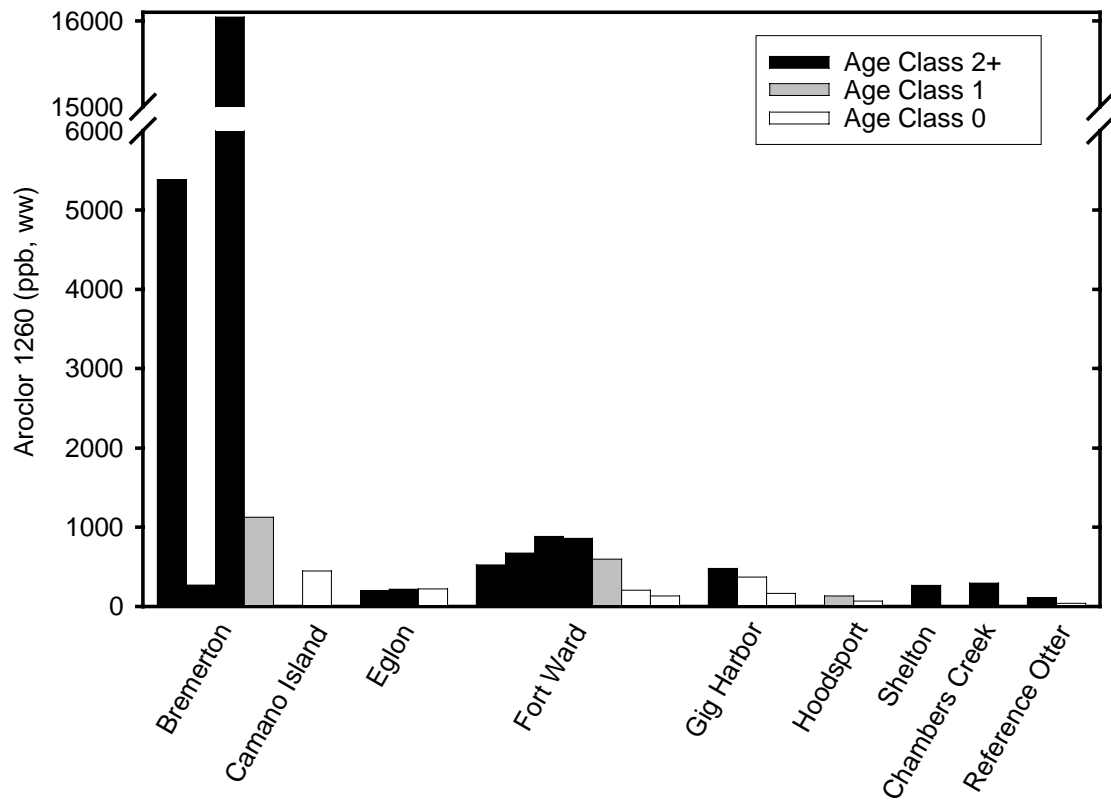


Figure 4. Aroclor 1260 levels in livers of river otter (age class 2+, 1, 0) collected from the Puget Sound, Washington, 1996. Levels reported in parts per billion (ppb) on a wet weight (ww) basis.

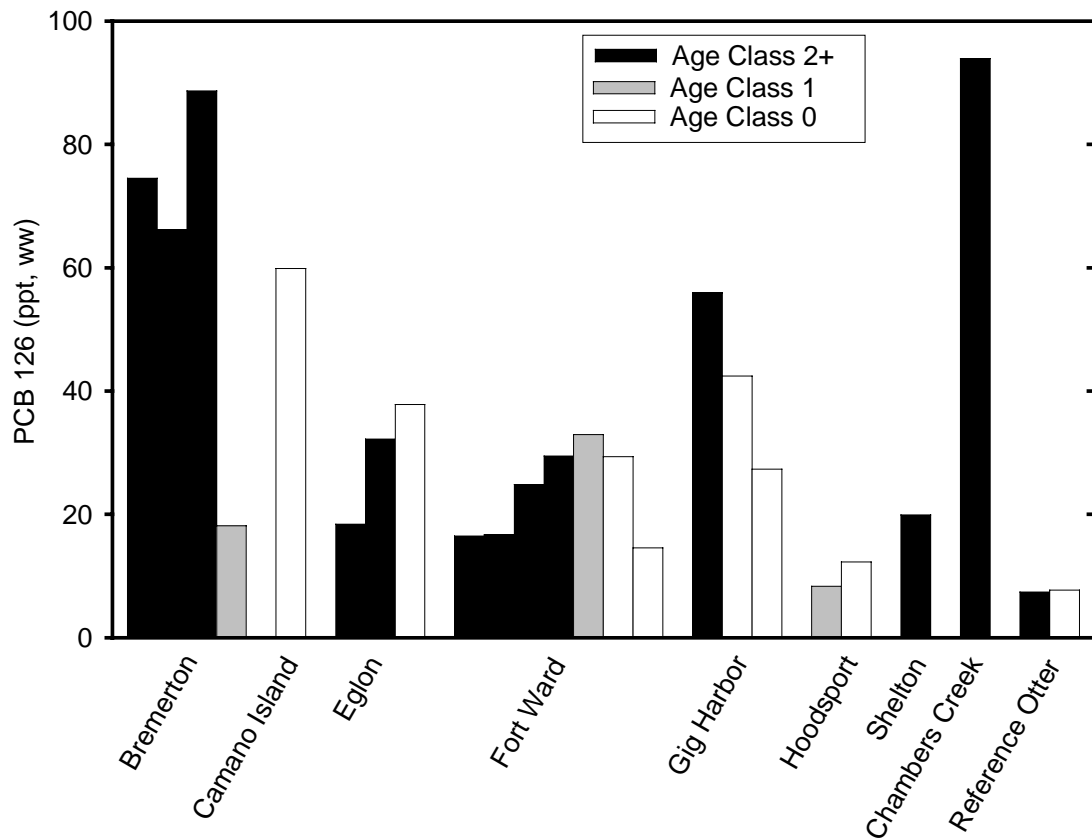


Figure 5. PCB 126 levels in livers of river otter (age class 2+, 1, 0) collected from the Puget Sound, Washington, 1996. Levels reported in parts per trillion (ppt) on a wet weight (ww) basis.

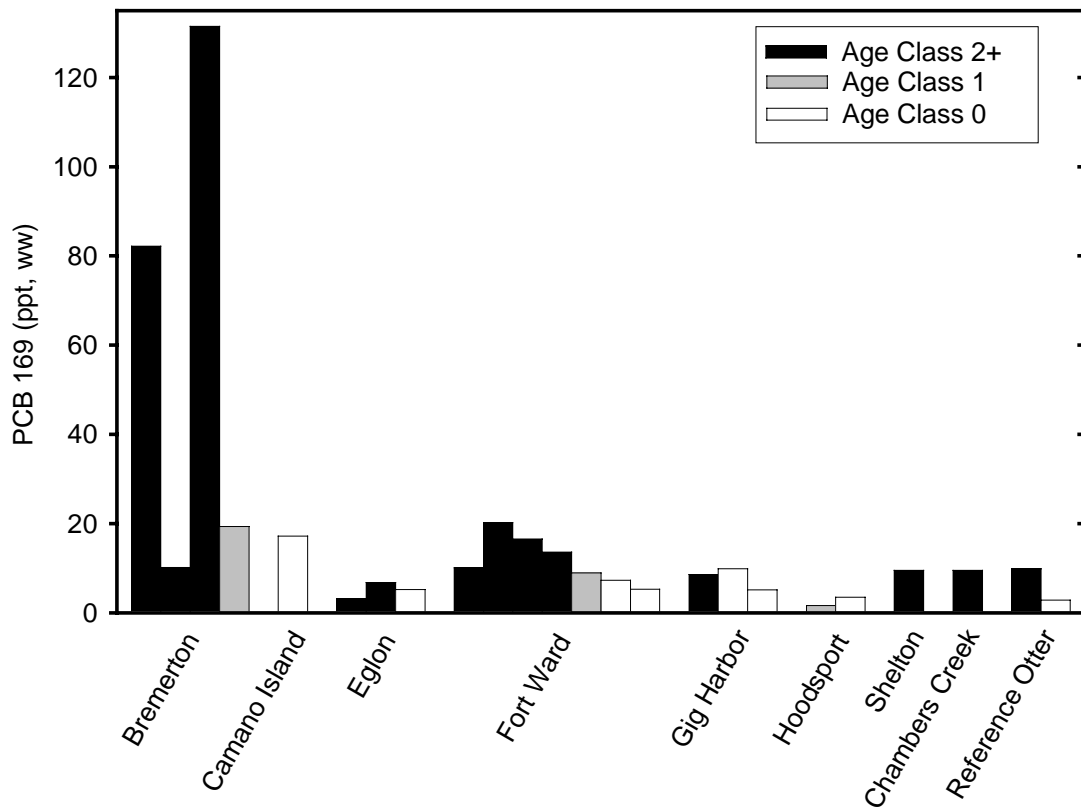


Figure 6. PCB 169 levels in livers of river otter (age class 2+, 1, 0) collected from the Puget Sound, Washington, 1996. Levels reported in parts per trillion (ppt) on a wet weight (ww) basis.

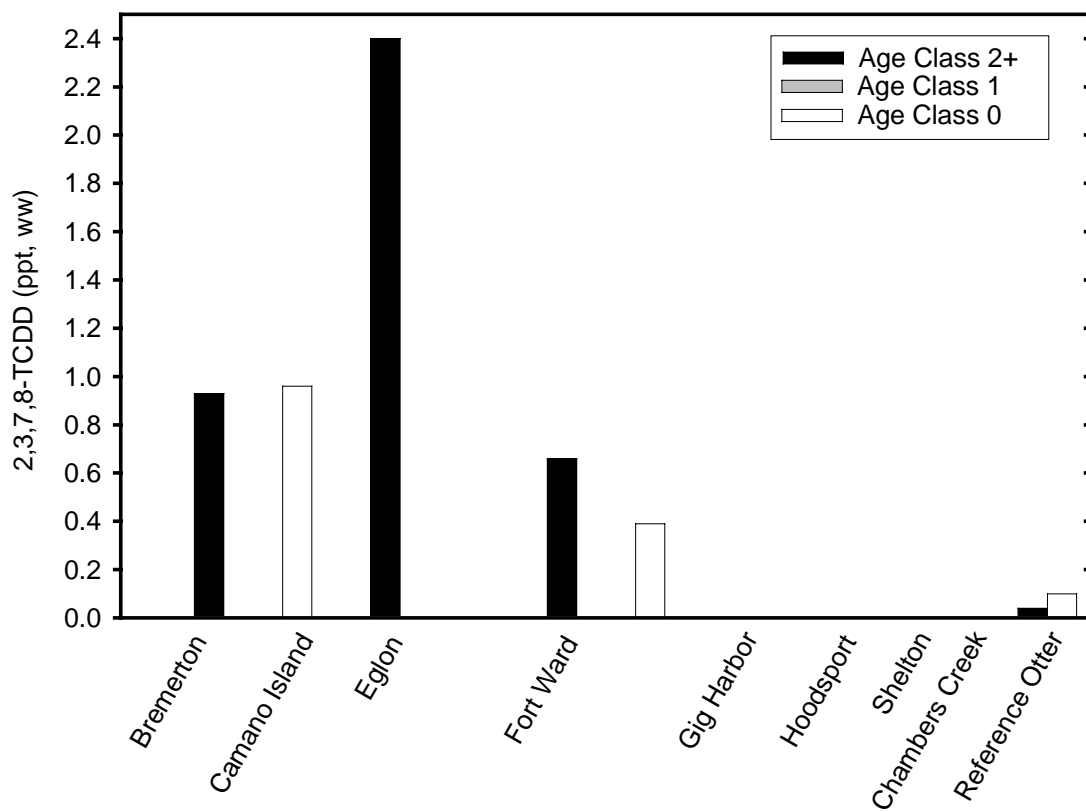


Figure 7. 2,3,7,8-TCDD levels in livers of river otter (age class 2+, 1, 0) collected from the Puget Sound, Washington, 1996. Levels reported in parts per trillion (ppt) on a wet weight (ww) basis.

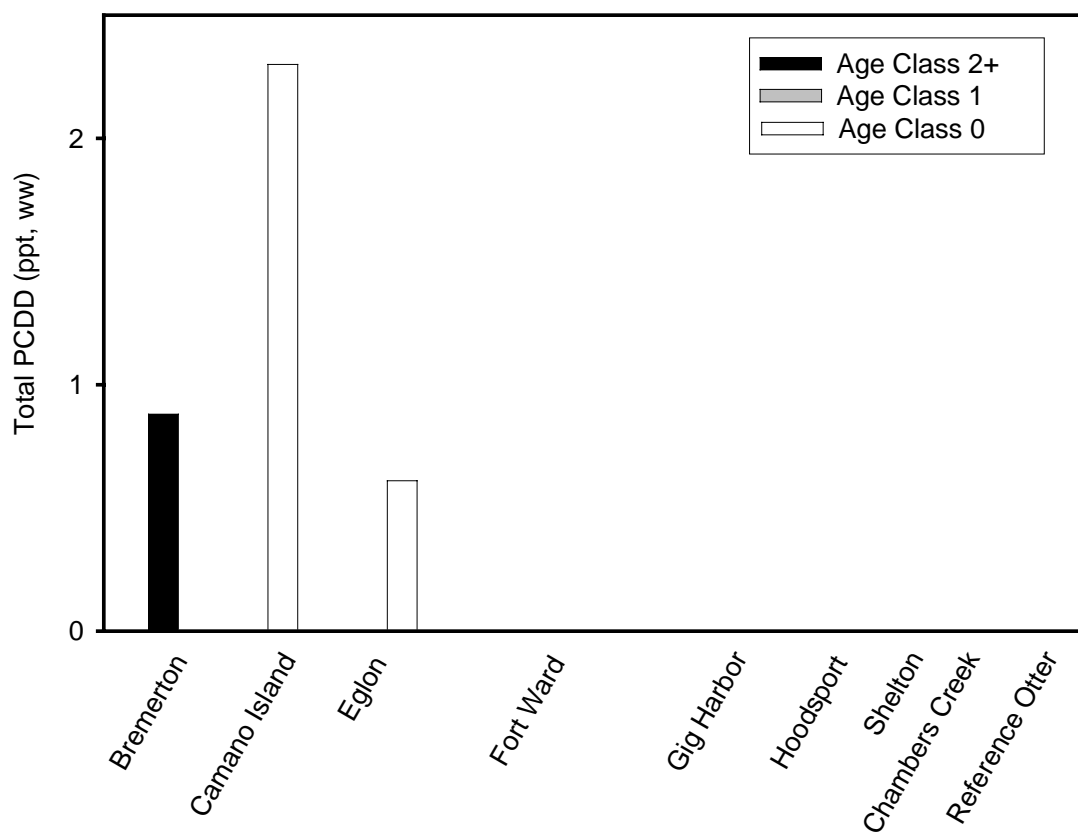


Figure 8. Total PCDD levels in livers of river otter (age class 2+, 1, 0) collected from the Puget Sound, Washington, 1996. Levels reported in parts per trillion (ppt) on a wet weight (ww) basis.

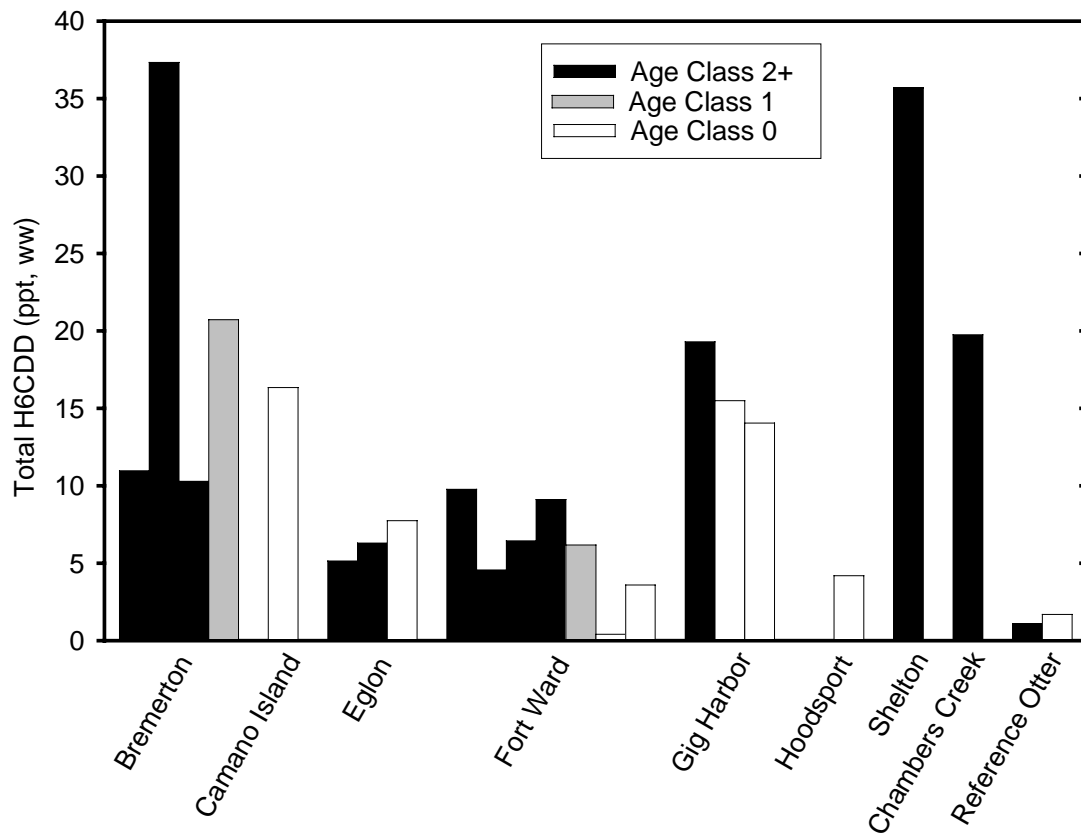


Figure 9. Total H6CDD levels in livers of river otter (age class 0, 1, 2+) collected from the Puget Sound, Washington, 1996. Levels reported in parts per trillion (ppt) on a wet weight (WW) basis.

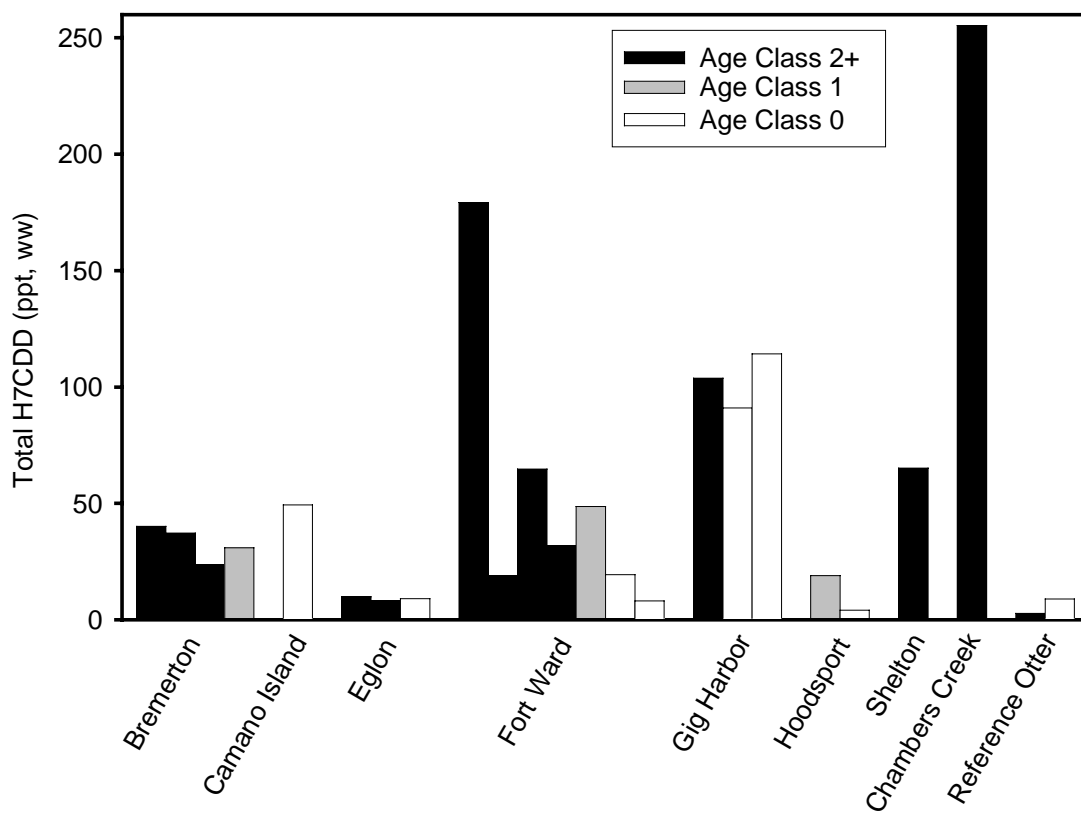


Figure 10. Total H7CDD levels in livers of river otter (age class 2+, 1, 0) collected from the Puget Sound, Washington, 1996. Levels reported in parts per trillion (ppt) on a wet weight (ww) basis.

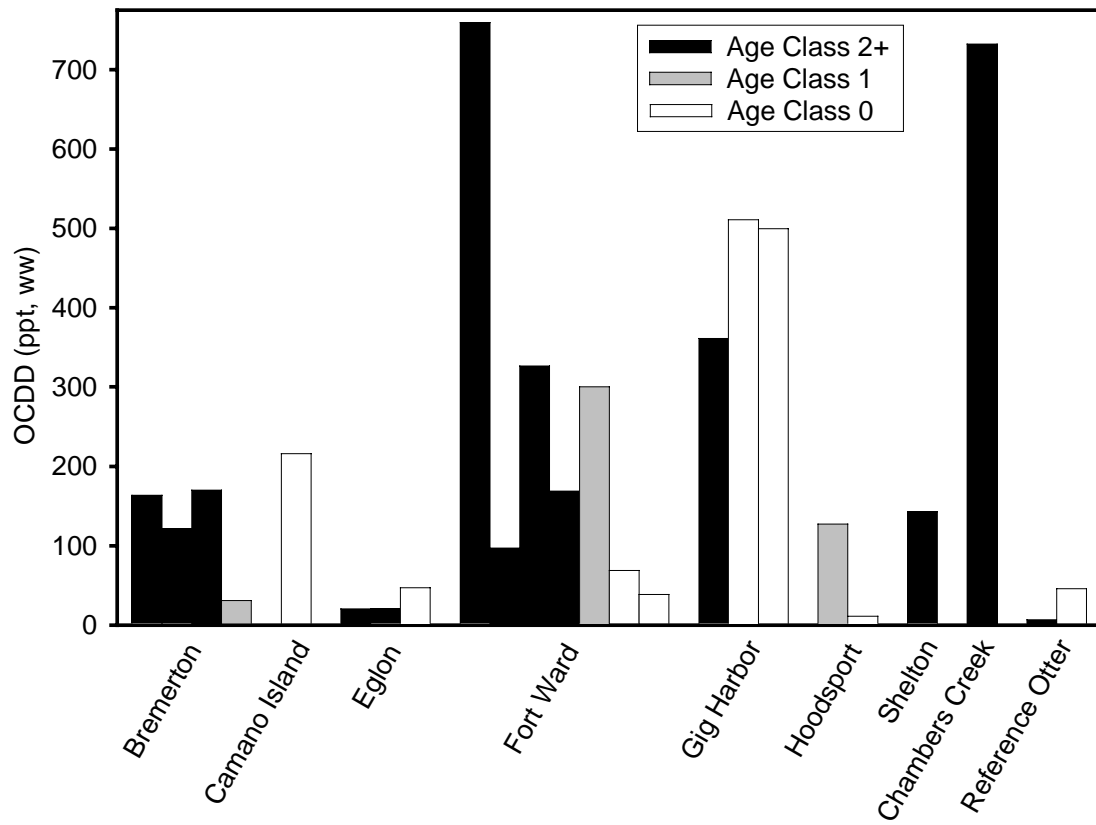


Figure 11. OCDD levels in livers of river otter (age class 2+, 1, 0) collected from the Puget Sound, Washington, 1996. Levels reported in parts per trillion (ppt) on a wet weight (ww) basis.

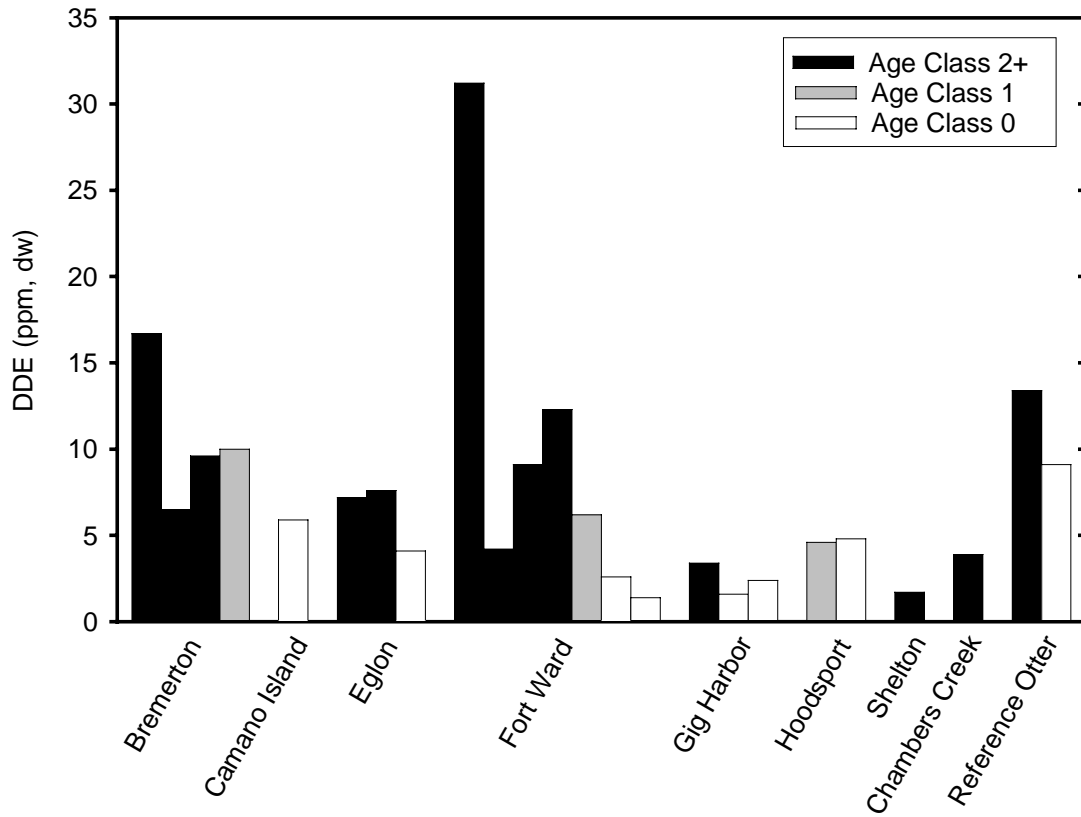


Figure 12. Mercury concentrations in livers of river otter (age class 2+, 1, 0) collected from the Puget Sound, Washington, 1996. concentrations reported in parts per million (ppm) on a dry weight (dw) basis.

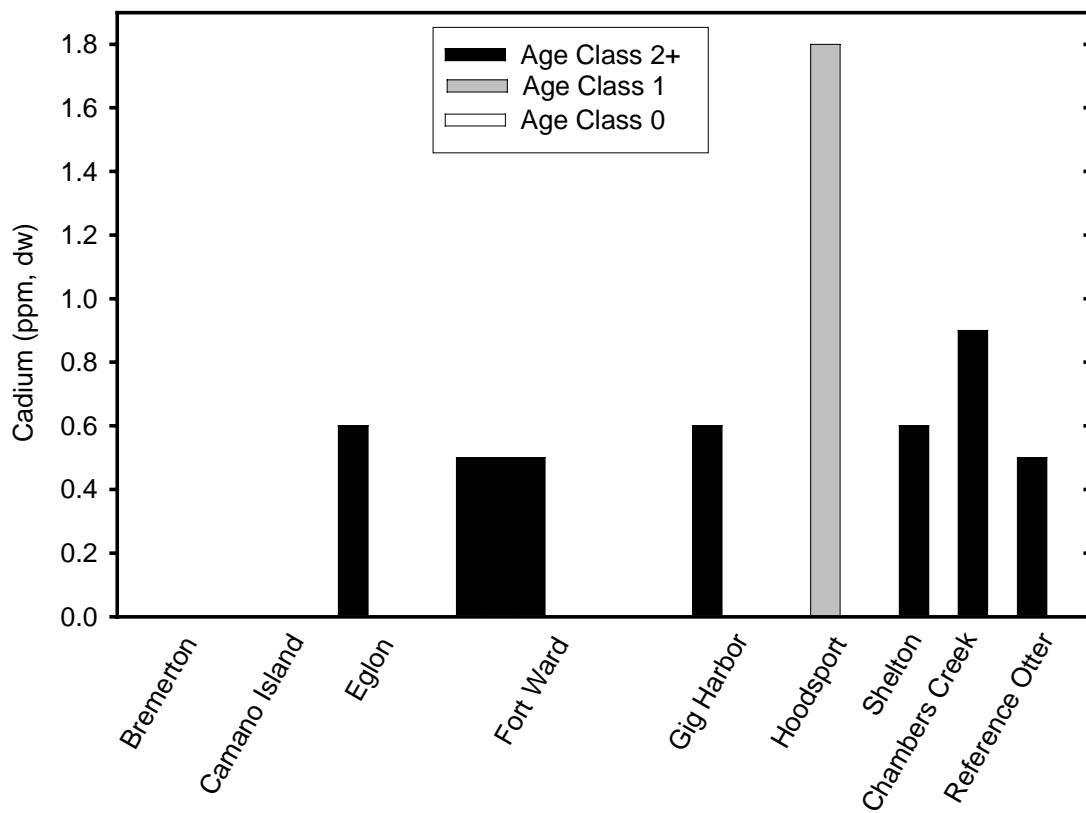


Figure 13. Cadmium concentrations in livers of river otter (age class 2+, 1, 0) collected from the Puget Sound, Washington, 1996. Concentrations reported in parts per million (ppm) on a dry weight (dw) basis.

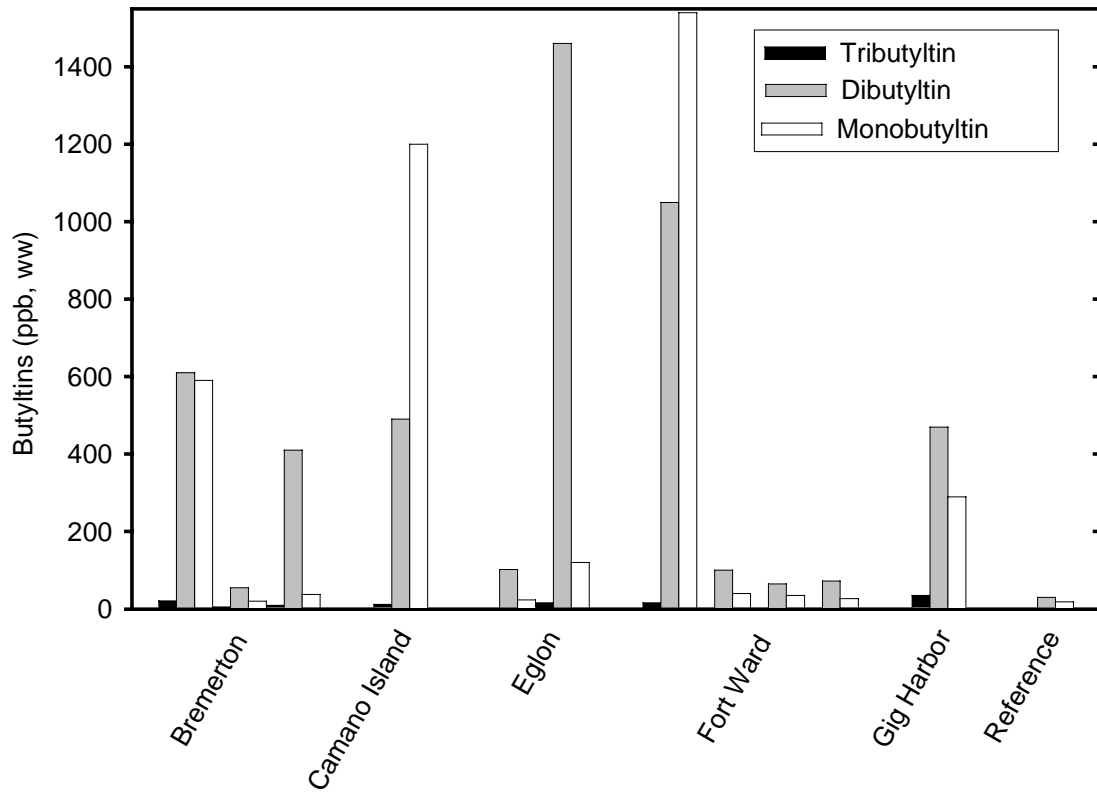


Figure 14. Butyltin concentrations in livers of river otter collected from the Puget Sound, Washington, 1996. Concentrations reported in parts per billion (ppb) on a wet weight (ww) basis